Perception of People about Climate Change in Western Nepal

Madhab Prasad Baral*

Abstract

People's perceptions of climate change are known to differ between the various group of different geographical locations and to have fluctuated over time. Climate change will have wide-ranging effects on the environment, socio-economic, and related sectors. Irregularities of precipitation and increased temperature are the most commonly mentioned results of climate change for most of the respondents. Age, sex, educational qualification, yearly income, occupation, the ethnicity of respondents significantly associated with the knowledge about climate change. People's perceptions of climate change at the local level may play a vital role to identify vulnerability to global climate change and to suggest some solutions for reducing the adverse impacts of climate change. Local people's perception is based on the climatic events that they faced and the concern about deforestations' excessive use of fossil fuels, air pollution, and urbanization. Local people's perception is very important for the developing countries in which there is no sufficient station about climatic data so their knowledge is useful for policymaking.

Introduction

Perception is the organization, identification, and interpretation of sensory information to represent and understand the presented information or environment (Schacter, Guerin, & . Jacques, 2011) Climate change is one of the greatest challenges issue in the world towards the various sectors of humanity and ecosystem (Pachauri, et al., 2014). Public views about climate change play a vital role in understanding the knowledge base and cooping strategy of local people which is very fruitful to make the climate change policy and delivering the effective plan for addressing the issue. The perception of an individual determines one's knowledge gain about any ideas and their acceptance, adoption, continuance, and rejection as well. Also, it has been born with other requirements associated with the psychological object under consideration (Sujeetha & Palaniswamy, 2014). Perception captures the cognitive, affective, and evaluative dimensions of individuals' internal representations of the issue, but critically understand these representations to be shaped by social processes and cultural context (Whitmarsh, 2011).

**Ph. D. Scholar, Central Department of Statistics, Tribhuvan University*

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The public perception about climate change is being realized as the essential tool of understanding climate change adaptation problems and transmitting the potential solutions to the ground and local level. In most countries like Nepal where the scientific instrumental records of climate are limited, the local perception provides a strong basis to confirm the change in climatic variables. (Tiwari, Awasthi, Balla, & Sitaula, 2010)

As compared to other regions of the world there have been limited studies of climate change and its impact on the Himalayan region including Nepal. Most studies conducted to study climate change in this region depend on historical records of temperature and precipitation. Various limitations are to be faced for the study of climate change in a less developed country like Nepal. Due to the limited number of poorly maintained weather stations, it is difficult to analyze the trends of temperature and precipitation of the region (Shrestha & Aryal, 2011). Also, most of the research was conducted in a small village using limited climatic records with a limited sample size. Again the majority of studies about climate change are either concentrated on analyzing scientific data or documenting perceptions of people which are not found generally congruent. (Chaudhary & Bawa, 2011)

The authentic study about the impact of climate change on various sectors was conducted by the Central Bureau of Statistics which is the body of the Nepal government in 2016 using survey method collecting 5060 households from 16 strata consisting of four climatic zones with 253 primary sampling units (PSU). The survey is considered as the milestone towards addressing the gap of research data for studying the impact and effect of climate change on various sectors like hydrology, ecosystem, agriculture, biodiversity, and human health (CBS, 2017) This study aims to examine people's perception about the climate change in five districts of the western region of Nepal namely Mustang, Baglung, Kaski, Tanahun, and Rupandehi representing of all three ecological zones(mountain, hill, and terai).

Materials and methods

Survey data

This study concentrates to analyze the local people's perception of climate change based on secondary data collected by the central bureau of statistics through the national climate change impact survey (NCCIS) 2016. The survey is taken as the most comprehensive and representative to understand the perception of people about climate change and its impacts on the socio-economic and environmental aspects of their life. From the data of 26 districts with 253 primary sampling units, the five

districts with 39 PSU which lie in the western region of Nepal are selected consisting of 780 households. In the survey, the PSUs were chosen from the district using the probability proportional to size(PPS) method, and Twenty households were selected from every selected PSU using a systematic random sampling method.

The reliability of the survey is maintained by CBS performing various pre-survey activities like pilot survey, design of the survey questionnaire, a desk review of the pilot survey questionnaire, intensive workshop to improve the provision of data generation and finalizing the questionnaire, thematic workshop to finalize the respective thematic questionnaire, international expert review, pre-test of the questionnaire, finalization of the questionnaire, and manual preparation which aimed to clarify concepts, content, and terms used in the questionnaire to understand for everyone.

The validity is maintained by applying the scientific tools which are exactly fit and suitable for the specified area consulting with international experts.

The obtained data are analyzed by using various descriptive statistics and Generalized linear models(GLM) taking the help of SPSS software.

Results

Demographic Characteristics

There is diversity among 780 respondents in terms of gender, age, education level, income, occupation, social composition(cast/ethnicity), and geographic location (presented in table 1). About two-thirds(67.1%) of the respondents are male. The majority of the respondents (39.2%) were between 45 and 54 years, followed by respondents aged between 55 and 64 years (31.2%). The proportion of senior citizens of age 75 or more was least (7.2%). In respect to cast/ethnicity, Janajati (41.2%) and Brahmin/Chhetri (34.0%) were the major ethnic composition. Only 3.3 percentage of the respondents in this region have completed a bachelor or high degree whereas a large proportion has informal education (29.4%) followed by secondary education (26.4%) and primary education (24.7%). The proportion of illiterate respondents in this region was 16.2percent. About half of the respondents (50.2%) were farmers by profession, followed by nonagricultural business (15.3%). The majority of the respondents (75.5%) were living in the tropical climatic zone. The proportion of respondents who had resided in their locality for 45-54 years (27.1%) and 25-34 years (26.8%) were found approximately similar. The average income of a household in this region was Rs.420880.75 with a standard deviation of 510884.05.

Table 1: Socio-Demographic Characteristics of Respondents

Socio-demographic variables	Number	Percent
Gender		
Male	523	67.1
Female	257	32.
Age (years)		
45-54	306	39.2
55-64	243	31.2
65-74	175	22.4
75 & more	56	7.2
Cast/ethnicity		
Brahmin/ Chhetri	272	34.9
Janajati	321	41.2
Madhesi	72	9.2
Dalit	92	11.8
Muslim	19	2.4
Others	4	0.5
Climate zone		
Sub-alpine	20	2.6
Temperate	44	5.6
Sub-tropical	127	16.3
Tropical	589	75.5
Education		
Illiterate	126	16.2
Informal education	229	29.4
Basic level education(class 0-8)	193	24.7
Secondary education(class 9-12)	206	26.4
Bachelor & above	26	3.3
Employment		
Agriculture	392	50.2
Salary from job	96	12.3
Non- agricultural business	119	15.3
Household work	45	5.8

No work	99	12.7
Unable to work/Seeking job	29	3.7
Years of living in locality		
25-34 years	209	26.8
35-44	131	16.8
45-54	211	27.0
55-64	137	17.6
65-74	63	8.1
75 & more	29	3.7
Yearly income of the household		
Below Rs 50000	63	8.1
50000-150000	173	22.2
150000-250000	142	18.2
250000-350000	100	12 .8
350000-450000	60	7.7
Rs.450000 & above	242	31.0
Mean yearly income	Rs420880.75	
Std. Deviation	Rs 510884.05	

Perception of People about Climate Change

Like diversified geography, the respondents in the study area had a diverse and broad view about climate change (Table 2). Most of the respondents (93.3%) agreed that the climate in their place has changed. But only more than half of them (54.5%) heard about the word climate change. Television is the main source through which most of the respondents (59%) know about climate change. Radio plays a second vital role (20.8%) for providing information followed by neighbor/friends (7.3%), awareness campaign (6.8%), newspaper (4.7%). Most of the respondents (48.1%) perceived deforestation as the main source of climate change followed by natural causes (14.8%). 16.3%respondets express ignorance about the cause of climate change whereas 1.6% of respondents have taken god's wish as the main causes of climate change. Due to climate change majority (88.8%) mentioned that summer temperature has increased as compared to the temperature before 25 years, whereas 10% of respondents claimed no change. For winter temperature, 36.7% of respondents claimed increasing temperature, 39.2% claimed decrease whereas 24.1% claimed no change in winter temperature.

Most of the respondents claimed change in precipitation. About 83.0 percent perceived of decrease in monsoon rainfall while 90.8% mentioned a decrease in rainfall in the winter season. Almost all (99.3%) perceived drought as a severe extreme event due to climate change. Other extreme events felt by respondents due to climate change are sporadic rainfall(89.2%), heavy rainfall(88.3%), flood (80%), heat waves (79.7%), and cold waves(69.6%)

Table 2- People's Perception about Key Climatic Variables and Extremes

Survey questions	**Response**	**Frequency(Percentage)**
Do you hear about climate change	Yes	424(54.4)
	No	356(45.6)
Do you think the climate of this place is different than it was 25 years before?	Yes	728(93.3)
		52(6.7)
What is the main source of information about Climate change ?	Radio	88(20.8)
	Television	253(59.7)
	Newspaper	20(4.7)
	Awareness campaign	29(6.8)
	Local bodies	1(0.2)
	Neighbor/friends	31(7.3)
	Family members	2(0.5)
What may be the main cause of climate change?	Deforestation	350(48.1)
	Natural cause	108(14.8)
	Industrialization	27(3.7)
	Urbanization	58(8.0)
	Human interventio	22(3.0)
	God's wish	12(1.6)
	Earthquake	9(1.2)
	Others	23(3.2)
	Don't know	119(16.3)
How has the summer temperature changed Compared to 25 years before?	Increased	693(88.8)
	Decreased	9(1.2)
	No changed	78(10.0)

How has the winter temperature changed?	Increased	286(36.7)
	Decreased	306(39.2)
	No changed	188(24.1)
How has the rainfall in the monsoon changed compared to 25 years before?	Increased	19(2.4)
	Decreased	648(83.1)
	No changed	113(14.5)
How has the rainfall in winter changed?	Increased	4(0.5)
	Decreased	708(90.8)
	No change	68(8.7)
Experienced the changes in extreme events		
	Increased	Decreased
i) Heat waves	240(79.7)	61(20.3)
ii) Cold wave	238(69.6)	104(30.4)
iii)Drought	560(99.3)	4(0.7)
iv) Flood	96(80)	24(20)
v)Heavy rainfall	106(88.3)	14(11.7)
vi) Sporadic rain	356(89.2)	43(10.8)

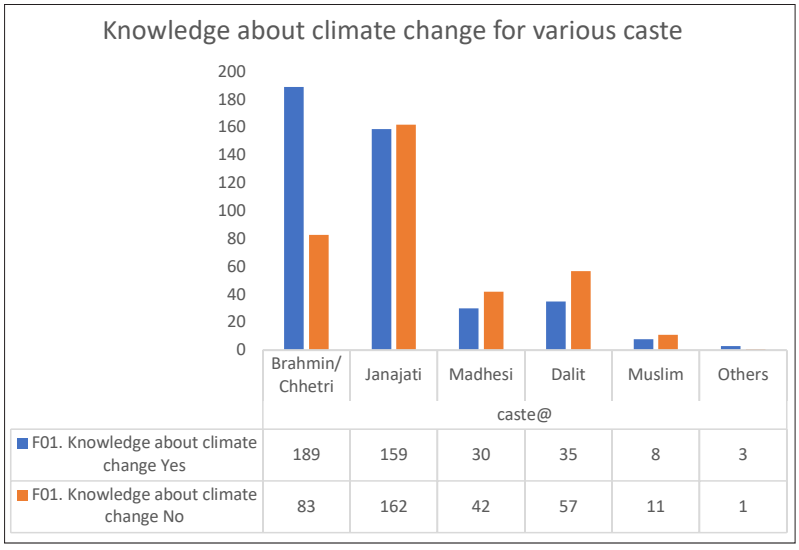

Figure 1: Knowledge about Climate Change of Various Caste/Ethnic Groups

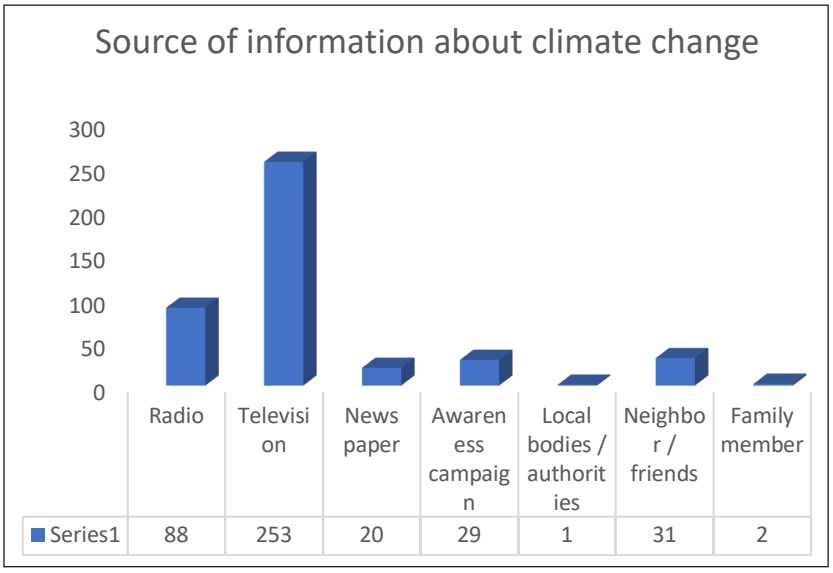

Figure 2 : Main Source of Information about Climate Change

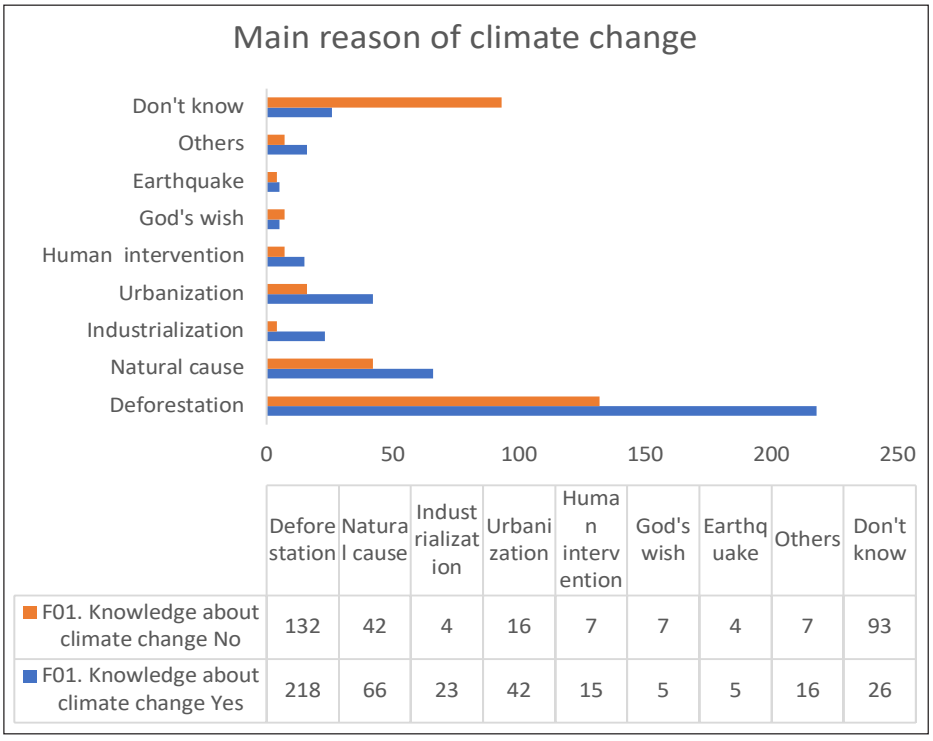

Figure 3 : People perception of climate change

The generalized linear model is used to predict the perceptions of people about climate change of different demographic and socio-economic categories by taking the last value of each category as a reference value. The values of regression coefficients and standard error of corresponding groups are presented in table 3. Male people of the study area are less conscious of climate change than a female with highly significant value($p<.001$). As compare to old-aged people young people are more sensitive about climate change but the values are insignificant. Regarding cast groups of others, the people in ethnicity group Brahman/Chhetri, Janajati, Madhesi, Dalit, and Muslim are more conscious with all insignificant values. Concerning the people with the education level of bachelor and above the illiterate and with low education level have more awareness about climate change with significant values in first three groups(illiterate, informal education and basic education level) and insignificant value of secondary education. About the people living in their locality for more than 75 years, the values of regression coefficients of all groups(25-34, 35-44, 45-54, 55-64, 65-74years) are negative which indicates the people living in short periods are less conscious towards climate change than that of long periods with significant values for first two groups(25-34 and 35-44 years) and insignificant values for other groups. By taking the income group of Rs450000 and above as a reference, it is found that the people with lower income are more conscious than with higher income with significant values for the groups below Rs 50000, 50000-150000, and 250000-350000 at 5% level of significance and others (150000-250000, 350000-450000) are insignificant.

Table 3: Generalized Linear Model Predicting Accuracy of Peoples' Perceptions of Climate Change

Dependent Variable	**Regression coefficients**	
(standard error)		
(Intercept)	2.373(1.7557)	
Demographics		
Gender (male)	-1.160 (0.2228)***	
	Gender (female)	0
	Age (45–54)	0.243(0.4536)
	Age (55–64)	0.201 (0.4594)
	Age (65-74)	0.566 (0.4609)
	Age (>75)	0.
Caste/ethnicity(Brahmin/chhetri)	0.110(1.3095)	

Caste/ethnicity (Janajati)	0.983 (1.3062)
Caste/ethnicity (Madhesi	1.239(1.3316)
Caste/ethnicity (Dalit)	1.337(1.3272)
Caste/ethnicity (Muslim)	1.985 (1.4061)
Caste/ethnicity (Others)	0
Education(Illiterate)	2.591(1.0641) *
Education (Informal education)	3.034(1.0621) **
Education (Primary)	2.238(1.0546)
Education (Secondary)	1.309(1.0597)
Education (Bachelor and above)	0
Living in the locality (25–34)	-1.250(0.6067) *
Living in the locality (35–44)	-1.311(0.6090) *
Living in the locality (45–54)	-0.912 (0.5999)
Living in the locality (55- 64)	-0.065(0.6237)
Living in the locality (65-74)	-0.310 (0.6714)
Living in the locality (>75)	0
Income (less than Rs.50000)	1.253(0.3778) **
Income(50000-150000)	0.642(0.2574) *
Income(150000-250000)	0.484(0.2657)
Income(250000-350000)	0.758(0.2909) **
Income(350000-450000)	0.177(0.3558)
Income(450000 and more)	0

Dependent variable: F01. Knowledge about climate change

Model: (Threshold), A08. Sex of respondent, and categorical variables age, education level, living years, income, and caste/ethnicity.

P values :***<.001, **<.01, *<.05

Discussion

This study has presented the perception of local people towards the impact of climate change in the western region of Nepal based on data collected by CBS during the national climate change impact survey 2016. The results of this study indicate

that majority of respondents confirm the consistent warming trend of climate in this region which is analogous to the previous study conducted by (Shrestha & Devkota, 2010) (Sharma, Chhettri, Shrestha, Mool, & Eriksson, 2009)), and the results of the integrated scientific study of NCCIS 2016. It is observed a higher degree of congruence between the perceptions of temperature (heatwave, cold wave, summer warming) and the observed changes in temperature parameters. People in this region perceived a significant decrease in both monsoon and winter precipitation which is not exactly matched with other researches (Baidya, Shrestha, & Sheikh, 2008); CBS, 2017). The average education level of this region is more than the national data which positively impacts their economic status as well as knowledge. The majority of people focus on drought as the main extreme event of climate change and the main reason for climate change is deforestation. This result is similar to the results of other studies; (Duncan J.M., Biggs, Dash J, & Atkinson, 2013); CBS, 2017).

Conclusion

The perception of local people is useful for making the adaptation policy though the results of public perception alone to devise adaptation policy and program may not be sufficient and scientific. The public perception of climate change is changing over various factors like time, demographics, and socioeconomic status. Also, the majority of people cannot express their perceptions and views accurately and clearly. Combinations of perceptions and instrumental records are the best way for developing a robust climate science.

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